Section 10.4a Quadratic Functions and Their Graphs

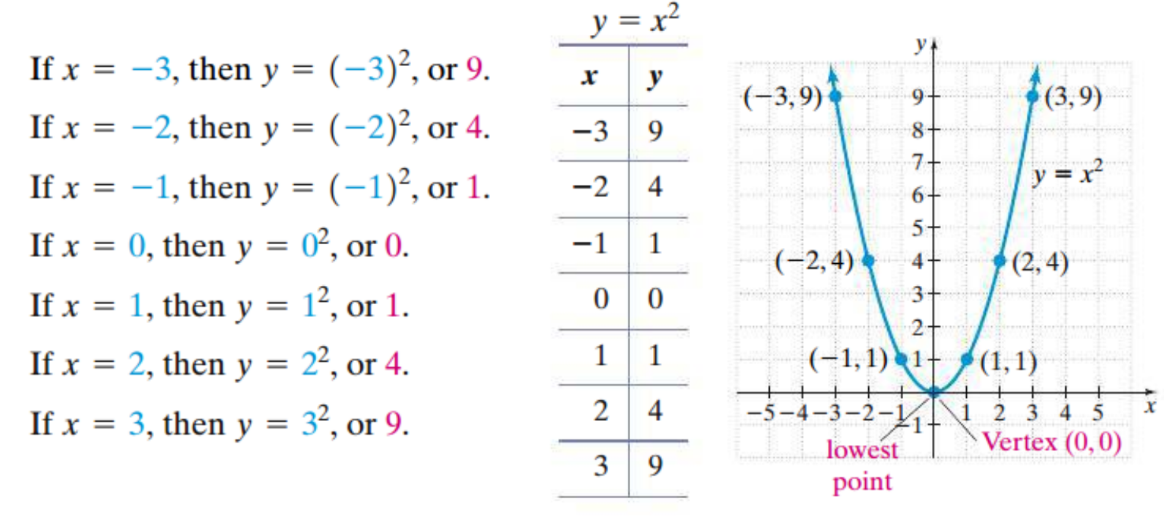
In previous sections, we solved quadratic equations. We will now study **quadratic functions** and their graphs.

**Quadratic Function**

A quadratic function is a function that can be written in the form where , and are real numbers and .

# Objective 1: Graphing

To graph the quadratic equation , we can make a table of values and use those points to draw the graph.



This curve is called a **parabola**. The lowest point on a parabola opening upward is called the **vertex**. The graph of a parabola is symmetric about the vertical line that passes through its vertex. The axis of symmetry for the graph of is the -axis, or the line .

Consider the quadratic function .

a. Complete the table and graph .

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b. State the vertex and axis of symmetry of the graph of .

c. Describe the transformations required to graph starting from the graph of .

# Objective 2: Graphing

Consider the functions and .

a. Graph and on the same axes.



b. State the vertex and axis of symmetry of the graphs of and .

c. Describe the graph of as a transformation of the graph of .

# Objective 3: Graphing

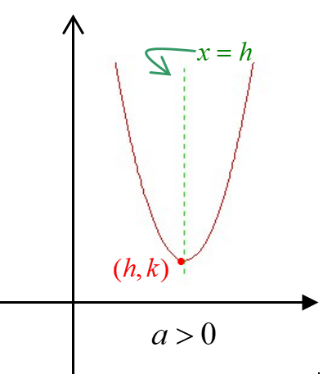
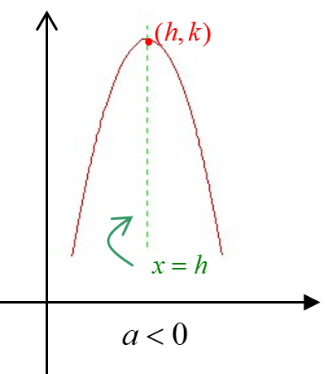
All quadratic functions can be graphed by using transformations of the graph of . In order to precisely graph a quadratic function, you need a minimum of three points, one of which is the vertex.

a. Graph . State the vertex and the axis of symmetry of the graph of .



**Graph of a Quadratic Function Written in the Form**

The graph of a quadratic function written in the form is a parabola with vertex . If , the parabola opens upward. If , the parabola opens downward. The axis of symmetry is the line defined by the equation .

b. Graph . State the vertex and the axis of symmetry of the graph of .

